Homeland Security & Public Safety

The Mission of NIST's
Office of Law Enforcement Standards (OLES)

A Presentation for the
Visiting Committee on Advanced Technology

NIST

Kathleen M. Higgins
Director, OLES

NIJ
NATIONAL INSTITUTE OF JUSTICE

OLES
OFFICE OF LAW ENFORCEMENT STANDARDS

FEDERAL AVIATION ADMINISTRATION

DEPARTMENT OF JUSTICE
FEDERAL BUREAU OF INVESTIGATION

Performance Standards

Compliance Testing Programs

Technical Reports

User Guides

Program Areas

- Chemical Systems and Materials
- Critical Incident Technologies
- Weapons and Protective Systems
- Detection, Inspection and Enforcement Technologies
- Forensic Sciences
- Public Safety Communications Standards

Computer Forensics & High Technology Crime

National Software Reference Library

- Electronic signatures of >1,000 COTS
- For identifying disguised illegitimate files

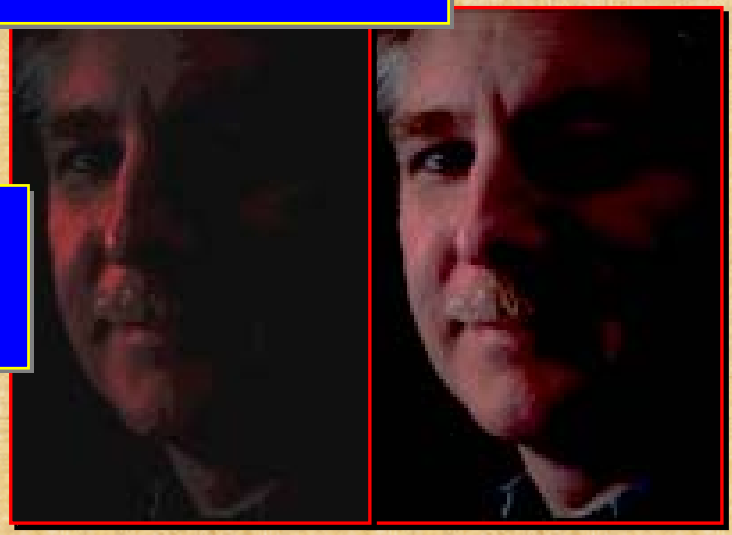
Computer Forensic Tools

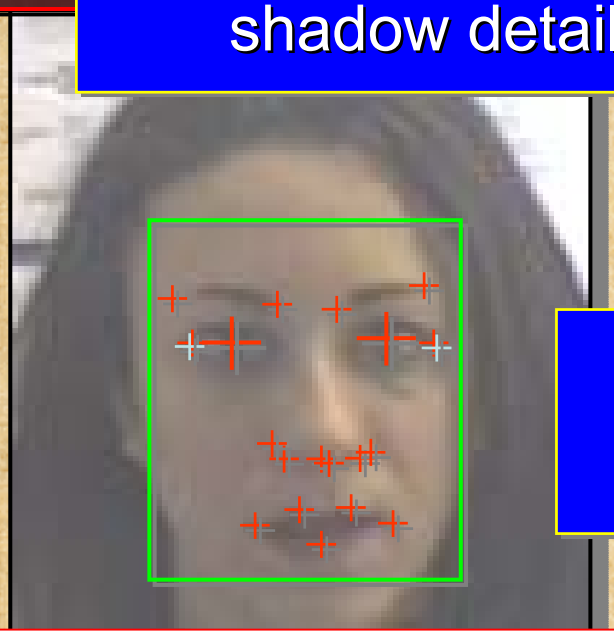
- For validating disk imaging software

BOTH HAVE APPLICATIONS IN WAR ON TERRORISM

Liquid-Filled Camera

- Greater resolution of shadow detail





Facial Recognition Technology

BOTH HAVE APPLICATIONS FOR HOMELAND SECURITY

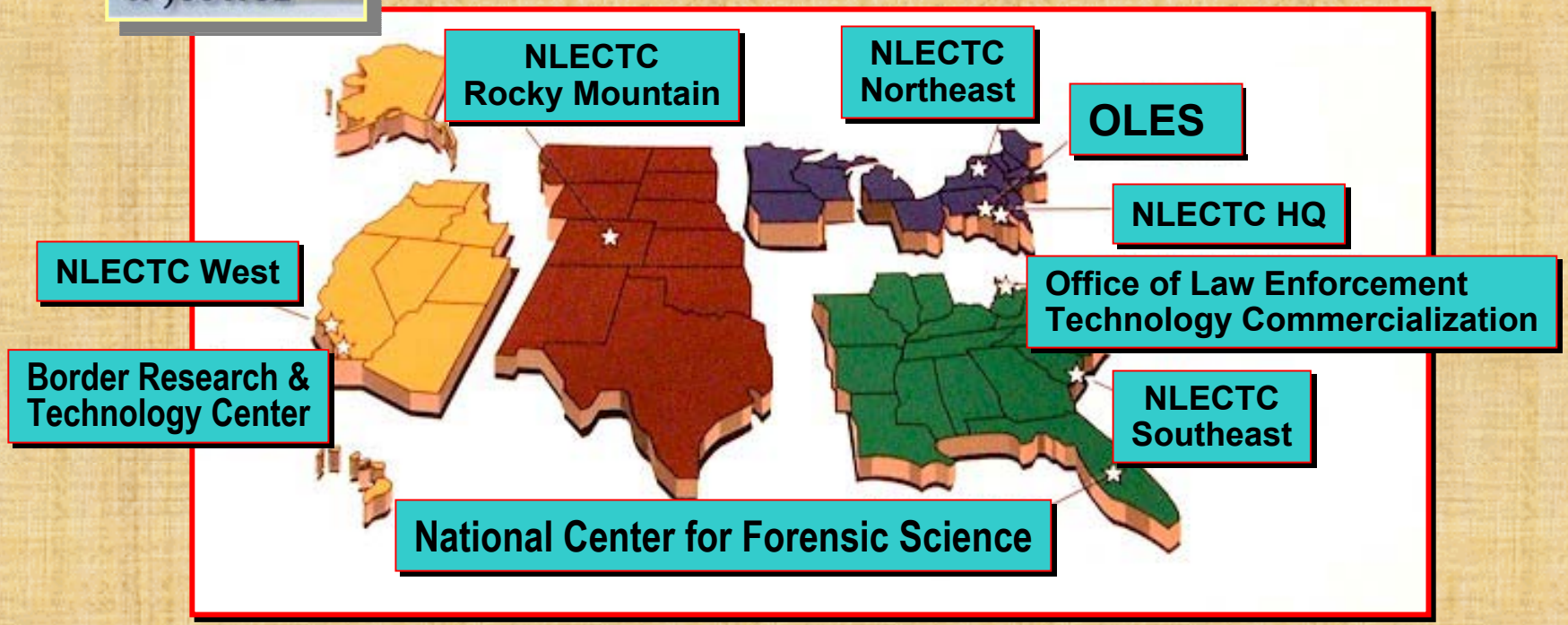

A handful of OLES programs are specifically "Homeland Security" programs …
… but *all* OLES programs have potential to enhance Homeland Security.
Lines between
Law Enforcement/Public Safety Technologies
and
Homeland Security Technologies
are largely imaginary

Organization of Program Managers

- Design & Administer projects
- Find best-qualified people to be our Project Champions:

Armor & Protective Systems Working Group ♦ U.S. Secret Service
Police Scientific Development Branch, U.K. ♦ University of Virginia
US Army Aberdeen Test Center ♦ Touchstone Research
Office of Special Technology, Technical Support Working Group
Royal Canadian Mounted Police ♦ FBI Engineering Research Facility
Independent Testing & Consulting, Inc. ♦ TASC, Inc.
DoD Computer Forensics Laboratory
University of Utah, Center for Human Toxicology
Institute of Surgical Research, Brook Army Medical Center
National Cybercrime Training Partnership
Institute for Telecommunication Sciences, Telecommunications and Information Administration
US Army Soldier Systems Command
University of Maryland at College Park Center for Automation Research

National Law Enforcement and Corrections Technology Center (NLECTC)



International Affiliations

- ISO Technical Advisory Group on Physical Protection
- European Committee on Standardization (CEN)
- NATO Research Group: Behind-Armor Blunt Trauma
- 5 Working Groups on Personal Protection, British Standards Institute (BSI)

TECHNOLOGY ADVISORY GROUP

Chair: Kathleen Higgins **Co-Chair:** Tom Russell

OLES Staff Members: S. Ballou, A. Fatah, G. Lieberman, P. Mattson, D. Orr, V. Pietrasiewicz, K. Rice

NIST Operating Unit Members:

- **810 Electronics and Electrical Engineering Laboratory (EEEL)**
  Dave Wollman
- **820 Manufacturing Engineering Laboratory (MEL)**
  Al Wavering
- **830 Chemical Science and Technology Laboratory (CSTL)**
  Bill Koch
- **840 Physics Laboratory (PL)**
  Lisa Karam
- **850 Materials Science and Engineering Laboratory (MSEL)**
  TBA
- **860 Building and Fire Research Laboratory (CSTL)**
  David Evans
- **890 Information Technology Laboratory (ITL)**
  Barbara Guttman
- **200 Technology Services (TS)**
  TBA

How can agencies prepare for attacks involving

Chemical

Biological

Radiological

Nuclear or

Explosive

Weapons?

The Interagency Board for Equipment Standardization and Interoperability (IAB)

Standardized Equipment List (SEL)

Items essential for responding to CBRNE incidents

"Most commodity SubGroups have realized that equipment that falls in the individual equipment categories will not provide suitable levels of field performance."

1999 IAB Annual Report

"It is critical that compatibility issues of equipment are addressed now, through nationally recognized standards, before the advent of multi-agency, multi-juridictional WMD incidents."

1999 IAB Annual Report

IAB STANDARDS COORDINATION COMMITTEE

OLES

- Committee's Executive Agent
- Standards Arbiter, Coordinator & Administrator

TEAM FORMED TO TACKLE TOP PRIORITY:

NIJ NATIONAL INSTITUTE OF JUSTICE

OFFICE OF LAW ENFORCEMENT STANDARDS OLES

NDPA

NDPO

OSHA

TSWG

NIOSH

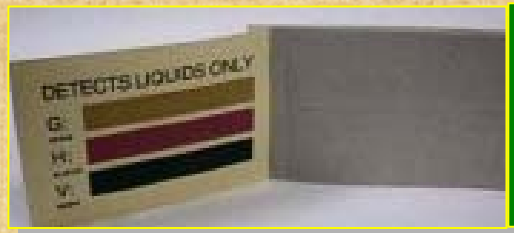
CUM SCIENTIA DEFENDIMUS SBCCOM

STANDARDS FOR CBRNE RESPIRATORY DEVICES

Achievements

- Identified types of threats and expected exposures
- Developed computer-based modeling tool
- Identified and analyzed related equipment standards
- Completed first CBRNE certification standard for SCBA
- Assisted NIOSH in completing new state-of-the-art testing lab
- Have begun testing commercially available SCBAs

STANDARDS FOR CBRNE RESPIRATORY DEVICES



Standards for Chemical Detection Devices

Nerve Agents

(mg/m^3)

AEGL Level 1 (8-hr. exp.)

GA/GB	**0.0010**
VX	**0.000028**

AEL/WPL

GA/GB	**0.0001**
GD	**0.00003**
VX	**0.00001**

Blistering Agents

(mg/m^3)

AEGL Level 1 (8-hr. exp.)

H/HD/HT	**0.0083**
Lewisite	**Not established**

AEL/WPL

H/HD/HT	**0.0004**
Lewisite	**0.003**

CBRNE Equipment User Guides

U.S. Department of Justice
Office of Justice Programs
National Institute of Justice

National Institute of Justice

Law Enforcement and Corrections Standards and Testing Program

Guide for the Selection of Chemical Agent and Toxic Industrial Mater Detection Equipment for Emergency First Resp

NIJ Guide 100-00

Volume I
June 2000

3.3.3 High Performance Liquid Chromatography (HPLC)

High performance liquid chromatography is most useful in the detection and identification of larger molecular weight chemical agents such as BZ or LSD, and in the detection and identification of biological agents. With HPLC, those compounds that do not easily volatilize can be analyzed without undergoing chemical derivatization. HPLC instrumentation is available from a variety of vendors such as Hewlett Packard, Perkin-Elmer, Shimadzu, and Varian, and is shown in Figures 3-15, 3-16, 3-17, and 3-18. As with GCs, HPLC instruments can be equipped with a variety of detectors such as ultraviolet–visible (uV-Vis) spectrometers, mass spectrometers, fluorescence spectrometers, and electrochemical detectors. Two limitations to the fielding of HPLCs and their detectors are the need for power requirements (120V house current) and high purity solvents. Currently there is no portable HPLC unit available.

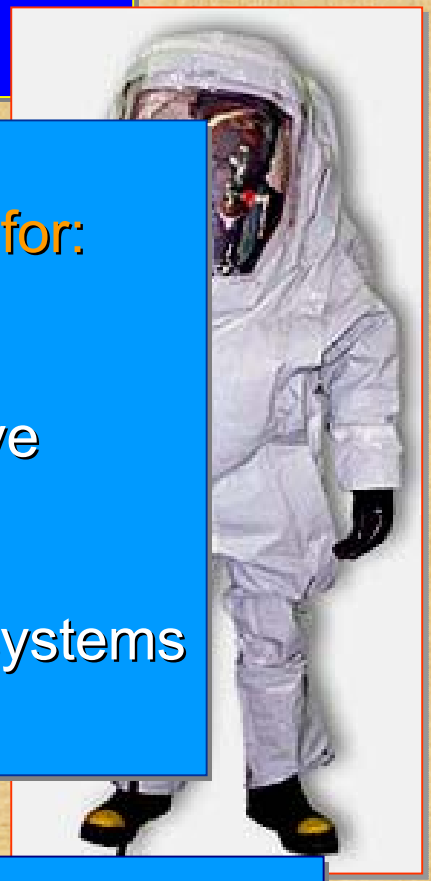
Figure 3-15. Hewlett Packard HP1000 HPLC System

Figure 3-16. Perkin-Elmer Turbo LC Plus HPLC System

Table 5-3. Handheld Portable Detection Equipment (CA)
May 2000

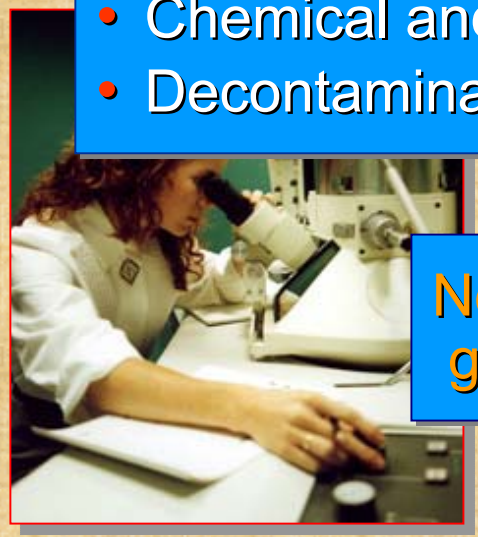
Detector Name	Chemical Agents Detected	TIMs Detected	Sensitivity	Resistance to Interferents	Response Time	Start-Up Time	Detection States	Alarm Capability	Portability	Battery Needs	Power Capabilities	Environment	Durability	Unit Cost	Ope
iRae 2000	●	TBD	○	TBD	●	◑	◑	●	●	●	◕	◑	TBD	◑	◑
IC Chemical Agent ector	●	○	◕	◔	●	●	◕	●	◑	●	◕	●	●	○	●
A Passport II PID itor	◑	TBD	○	TBD	TBD	TBD	◑	TBD	TBD	TBD	TBD	TBD	TBD	○	◑
anced Portable ector (APD) 2000	●	○	◔	◔	◕	◑	◑	●	◑	●	◕	●	TBD	○	◑
INDIV Individual ve Agent Detector	◑	○	◕	◕	○	◔	◑	○	TBD	NA	NA	●	●	TBD	●

CBRNE Equipment Standards Program FY 2003 Deliverables



Performance standards, test protocols, testing programs & research milestones for:

- Escape masks
- Air-purifying respirators
- Chemical, biological, radiological protective ensembles
- Lightweight protective clothing systems
- Chemical and biological agent detection systems
- Decontamination equipment



New decision aids and CBRNE equipment guides for First Responders

CBRNE Equipment Standards Program
What's Ahead?

Funding Shift from

NIJ NATIONAL INSTITUTE OF JUSTICE

To

Department of Homeland Security (DHS)

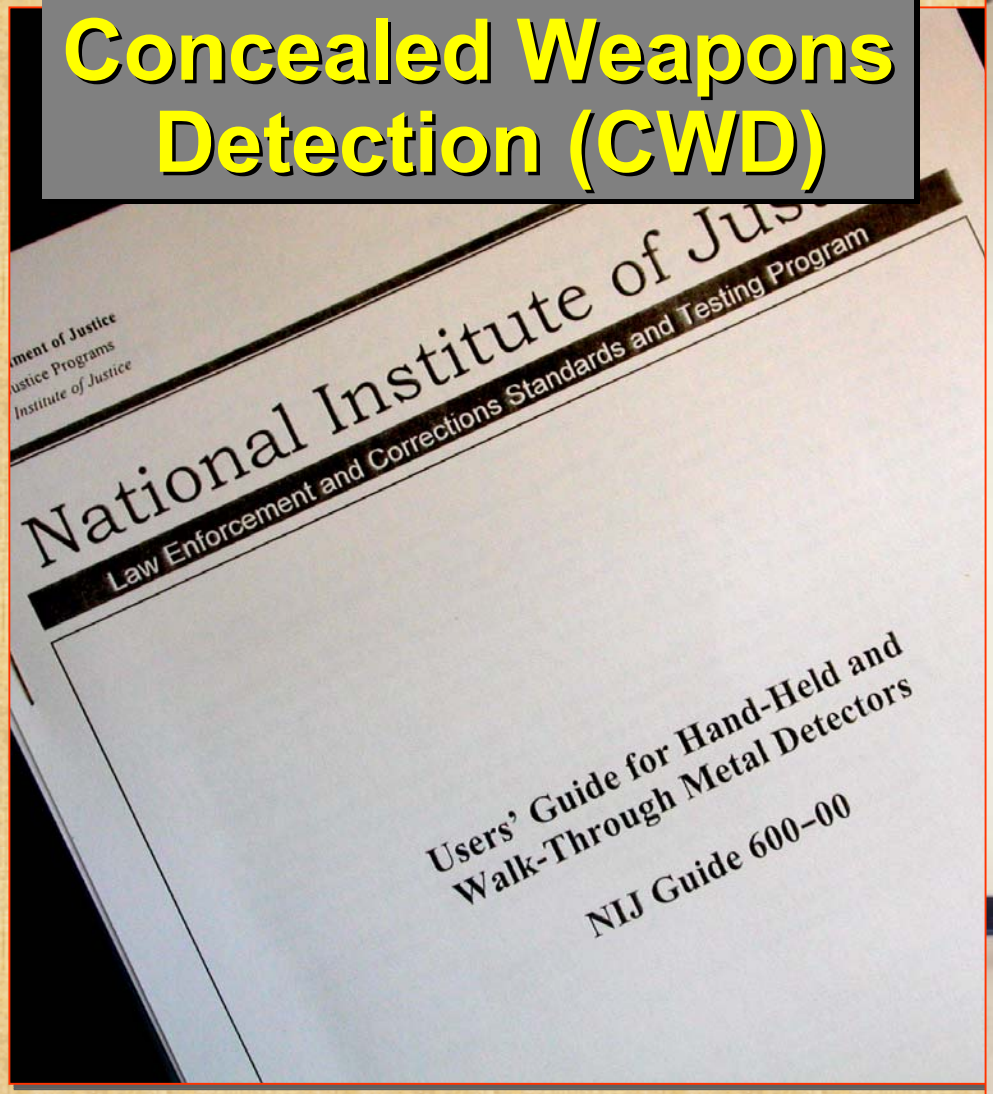
Now working with

OFFICE OF LAW ENFORCEMENT STANDARDS OLES

DHS Border & Transportation Security Directorate

Objective:
5-year, $15M CBRNE Equipment Standards Program

Concealed Weapons Detection (CWD)



Metal Detectors

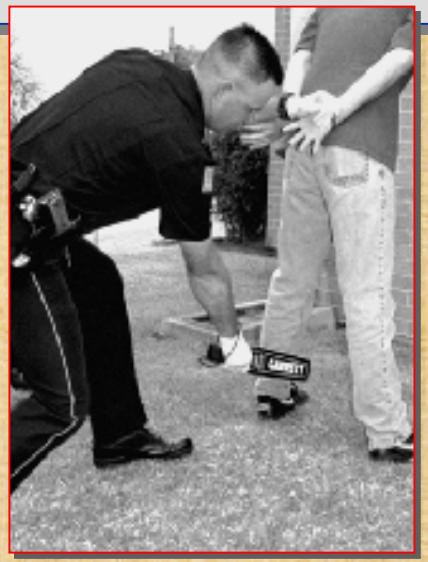
Must be able to detect traditional weapons & new generation of weapons

Must be safe for people wearing personal medical devices (PMDs)

Metal Detectors

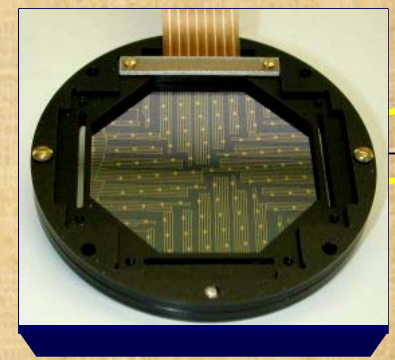
Among FY2003 deliverables:

- Support of NLECTC study of portal metal detectors
- Equipment Performance Report to TSA
- Establish testing program for hand-held detectors

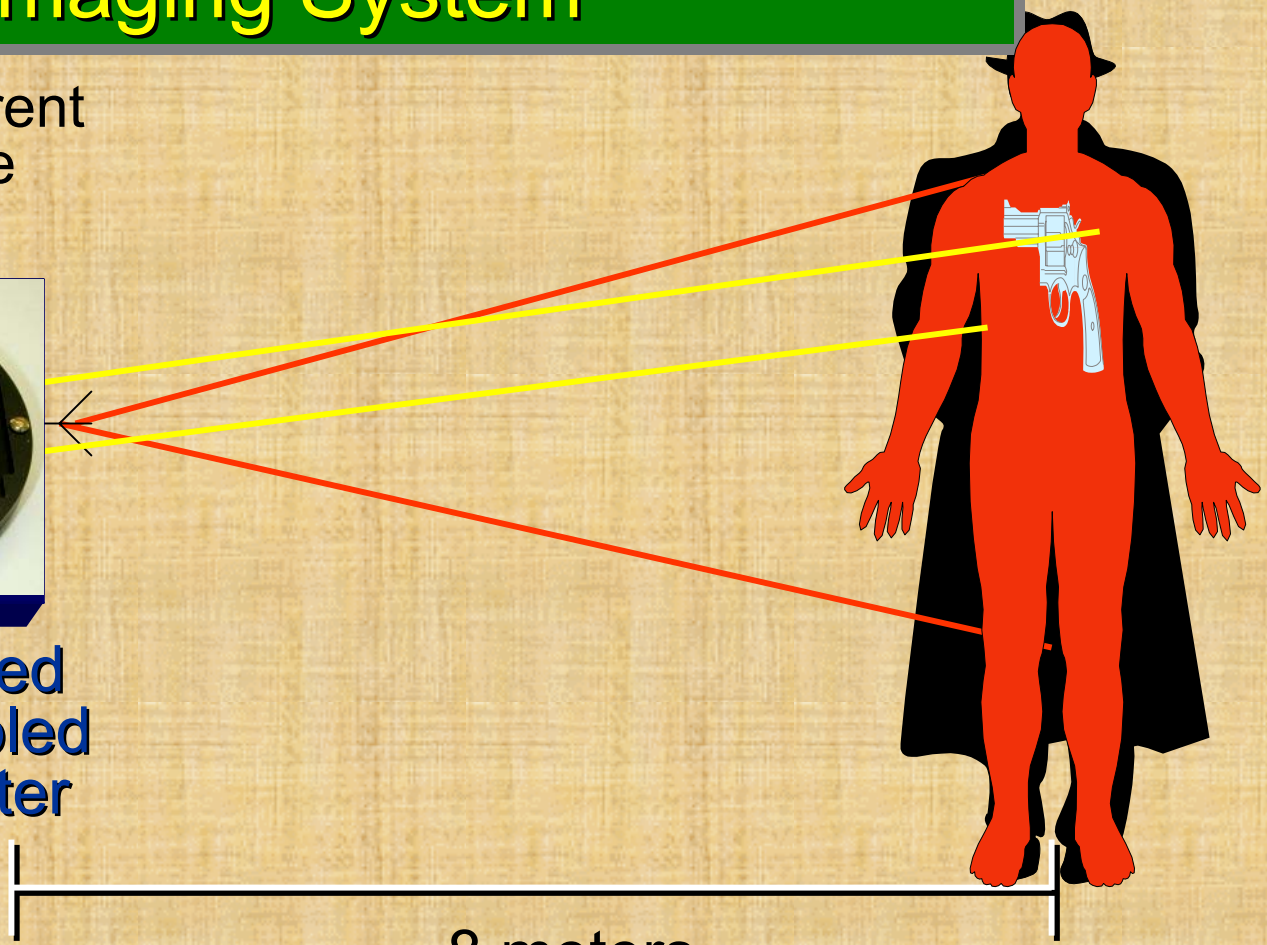


Wave Concealed Weapon Imaging System

Pulsed incoherent noise source 100 GHz



Niobium-based Antenna-coupled Microbolometer



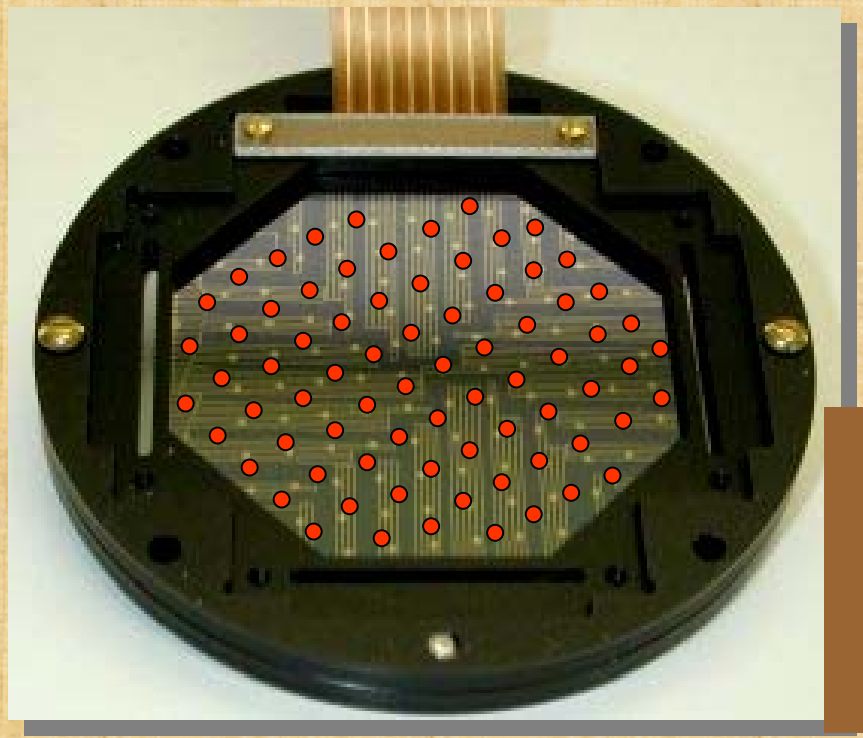
Remote Millimeter-Wave Concealed Weapon Imaging System

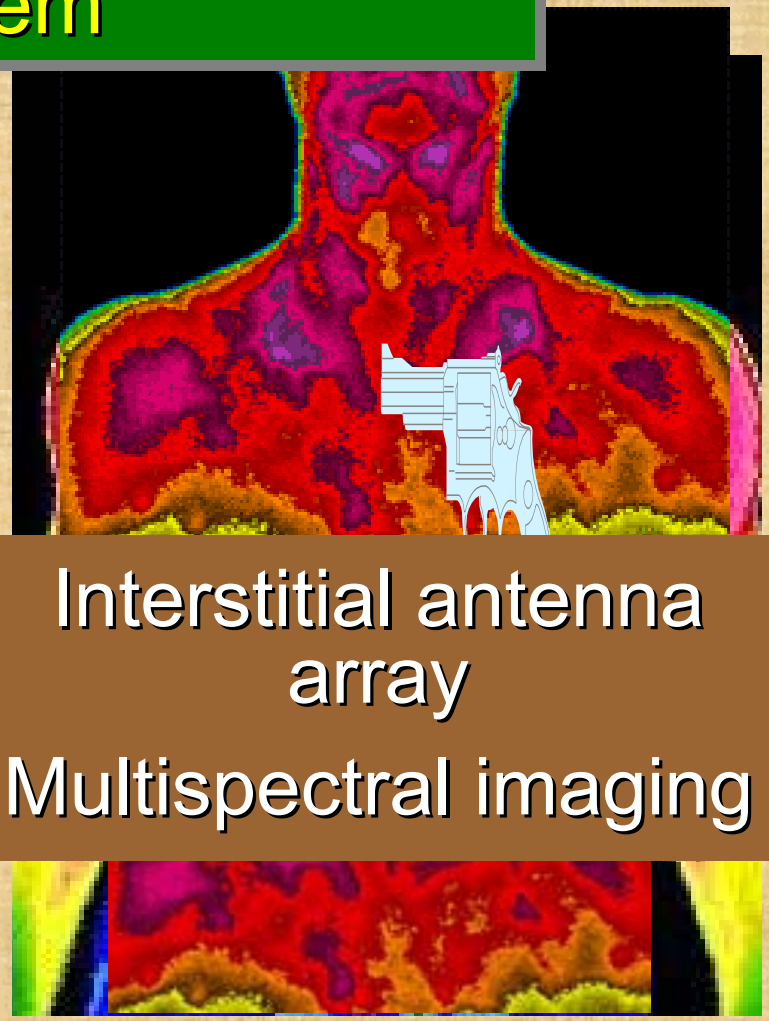
Large-scale monolithic fabrication

Frequency scaling

Room temperature operation

Remote Millimeter-Wave Concealed Weapon Imaging System





Interstitial antenna array

Multispectral imaging

Remote Millimeter-Wave Concealed Weapon Imaging System

February 2003

Meeting at NIST in Boulder, CO to assess current CWD research

Participants:

OLES/NIST

NIJ

TSA

U.S. Secret Service

TSWG

U.S.A.F. Rome Labs

Army Research Lab

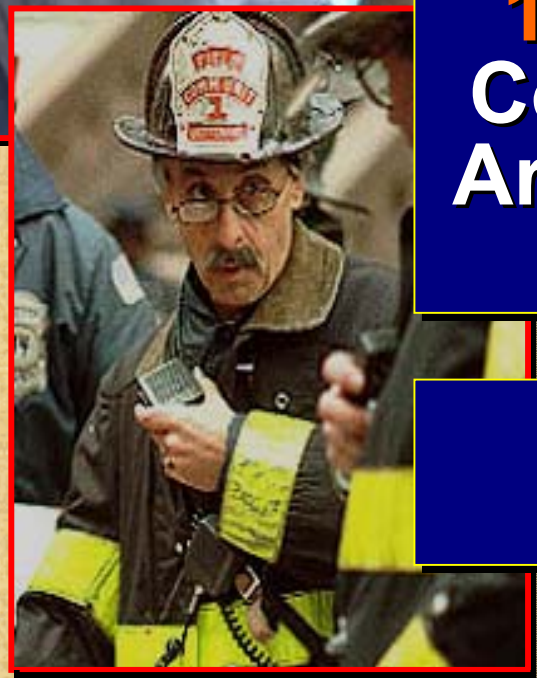
Comparison of User Requirements for CWD Systems

User/ Client	Target Objects	Indoor/ Outdoor Use	Cost	Configuration/ Size	Spatial Resolution	Real-Time Imaging	Imaging Distance from Target
NIJ	metallic/ non-metallic	both	$10k-$30k	portable/ hand-held	5 mm	yes	10 meters
TSA	metals plastics explosives ceramics	indoor	<$50k	portal or tunnel	5 mm	yes	0.5 - 2.0 meters
TSWG	large objects --dielectric, metallic	outdoor	not specified	portable	4 cm	yes	10 meters
Secret Service	large objects --dielectric, metallic	outdoor	not specified	portable	5 mm	yes	10 meters

Public Safety Communications Standards Program

52,000+
Organizations

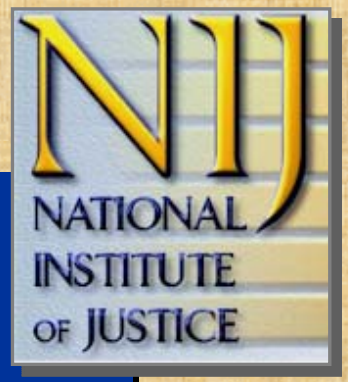
1000s of Devices in Mixed Suites



100s of Diverse Communications Architectures and Procedures

4 Isolated RF Bands

Advanced
Generation of
Interoperability for
Law
Enforcement



IT Interoperability Standards for Wireless Telecommunications And Information Technology

OLES Support of AGILE

- AGILE Strategic Plan for IT Standards
- Documentation for Wireless Standards Strategic Plan
- Technical evaluation of Audio Gateway

FY2003 Deliverables:

- Standards reports
- User guides
- Handbooks
- White Papers

June 26-27

NIST

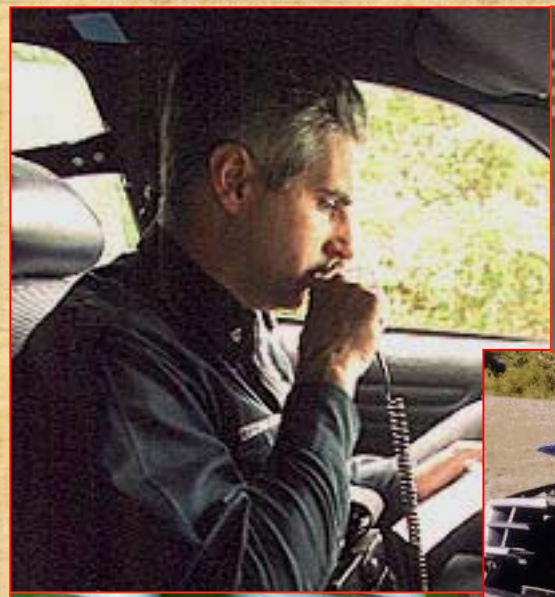
NIJ
NATIONAL INSTITUTE OF JUSTICE

DHS Science and Technology Directorate

First Responder Communications Workshop

Objective:

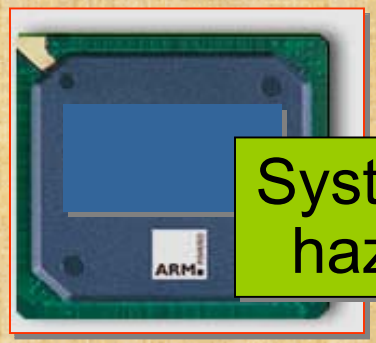
- Graphical matrix of existing programs and requirements



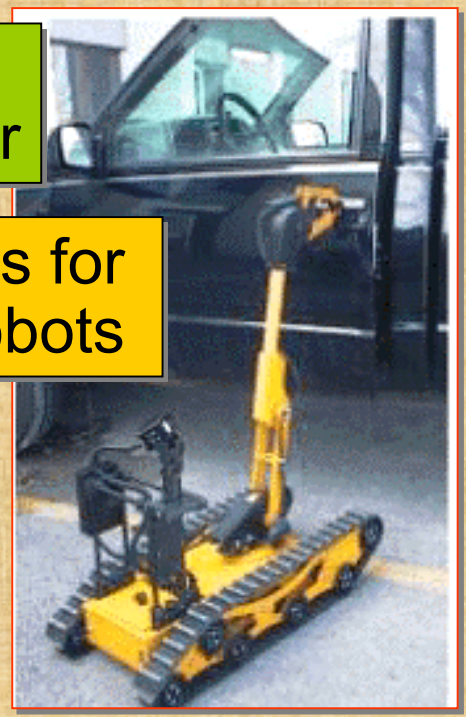

POLICE


BOMB SQUAD
SPECIAL
OPERATIONS

Hoped-for New Starts – FY2003:

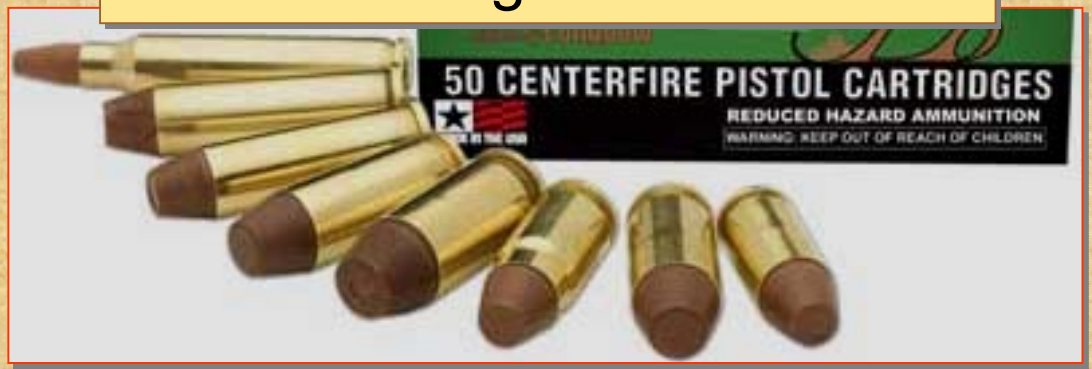


System-on-a-Chip (SOC) hazardous substance detector



Performance metrics for bomb-disposal robots

Guide to frangible ammunition



stan’•dard (n.)

a conspicuous object (as a banner) carried at the top of a pole and used to mark a rallying point, especially in battle, or to serve as an emblem.

Office of Law Enforcement Standards (OLES)

NIST